STATIONARY SOURCE PERMIT TO MODIFY AND OPERATE

This permit supersedes your permit dated December 22, 2004, amended March 28, 2006.

In compliance with the Federal Clean Air Act and the Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution,

O'Sullivan Films, Inc.
1944 Valley Avenue
Winchester, Virginia 22601
Registration No.: 80333
Plant ID No.: 51-840-0060

is authorized to modify and operate

Calender Line No. 2

located at

1944 Valley Avenue
Winchester, Virginia

in accordance with the Conditions of this permit.

Approved on: DRAFT

Deputy Regional Director, Valley Region

Permit consists of 8 pages.
Permit Conditions 1 to 23.
Source Testing Report Format.

INTRODUCTION

. This permit approval is based on the permit applications dated May 5, 2004, May 18, 2006, July 13, 2006, August 21, 2006, October 25, 2006, and July 19, 2007 including supplemental information dated July 1, 2004, August 13, 2004, August 26, 2004, August 30, 2004, August 11, 2006, October 5, 2006, November 13, 2006, February 1, 2007, May 7, 2007,August 16, 2007 and January 15, 2008, and including amendment information dated March 2, 2006. Any changes in the permit application specifications or any existing facilities which alter the impact of the facility on air quality may require a permit. Failure to obtain such a permit prior to construction may result in enforcement action.

Words or terms used in this permit shall have meanings as provided in 9 VAC 5-10-10 of the State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution. The regulatory reference or authority for each condition is listed in parentheses () after each condition.

Annual requirements to fulfill legal obligations to maintain current stationary source emissions data will necessitate a prompt response by the permittee to requests by the DEQ or the Board for information to include, as appropriate: process and production data; changes in control equipment; and operating schedules. Such requests for information from the DEQ will either be in writing or by personal contact.

The availability of information submitted to the DEQ or the Board will be governed by applicable provisions of the Freedom of Information Act, §§ 2.2-3700 through 2.2-3714 of the Code of Virginia, § 10.1-1314 (addressing information provided to the Board) of the Code of Virginia, and 9 VAC 5-170-60 of the State Air Pollution Control Board Regulations. Information provided to federal officials is subject to appropriate federal law and regulations governing confidentiality of such information.

PROCESS REQUIREMENTS

1. **Equipment List** - Equipment to be modified and operated at this facility consists of:

   - Calender Line No. 2

   Equipment included in the Calender Line No. 2 consists of:

   - two pre-blenders each with a capacity of 1.76 tons/hr (Calmix 2b1 and Calmix 2b2)
   - one Banbury mixer with a capacity of 3.51 tons/hr (Calmix 2a)
   - one Nippon Roll Calender with a maximum rated capacity of 3.51 tons/hr (Cal 2)

   (9 VAC 5-80-1180 D3)

2. **Emission Controls: Pre-blenders (Calmix 2b1 and Calmix 2b2)** – Particulate emissions from pre-blenders (Calmix 2b1 and Calmix 2b2) shall be controlled by fabric filters. Each fabric filter shall be provided with adequate access for inspection.
(9 VAC 5-80-1180)

3. **Emission Controls: Banbury Mixer (Calmix 2a)** – Particulate emissions from the Banbury mixer (Calmix 2a) shall be controlled by a fabric filter. The fabric filter shall be provided with adequate access for inspection and shall be in operation when the Banbury mixer (Calmix 2a) is operating.
(9 VAC 5-80-1180)

4. **Fabric Filters** – Each fabric filter serving the pre-blenders (Calmix 2b1 and Calmix 2b2) and Banbury mixer (Calmix 2a) shall be installed, maintained, calibrated and operated in accordance with approved procedures which shall include, as a minimum, the manufacturer's written requirements or recommendations.
(9 VAC 5-80-1180)

5. **Emissions Testing -** The permitted facility shall be constructed so as to allow for emissions testing and monitoring upon reasonable notice at any time, using appropriate methods. This includes constructing the facility such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and providing stack or duct that is free from cyclonic flow. Test ports shall be provided when requested at the appropriate locations.
(9 VAC 5-50-30 F and 9 VAC 5-80-1180)

OPERATING/EMISSION LIMITATIONS

6. **Throughput: Calender Line No. 2 –** The throughput of raw materials processed by Calender Line No. 2 shall not exceed 24,000 tons per year, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9 VAC 5-80-1180)

7. **Emission Limits: Preblenders (Calmix 2b1 and Calmix 2b2) -** Emissions from the operation of the two pre-blenders (Calmix 2b1 and Calmix 2b2) shall not exceed the limits specified below:

PM	0.38	lbs/hr	1.3	tons/yr
PM-10	0.38	lbs/hr	1.3	tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits shall be considered credible evidence of

the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 2 and 6.
(9 VAC 5-80-1180)

8. **Emission Limits: Banbury Mixer (Calmix 2a)** - Emissions from the operation of the Banbury mixer (Calmix 2a) shall not exceed the limits specified below:

PM	0.56	lbs/hr	1.9	tons/yr
PM-10	0.56	lbs/hr	1.9	tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits shall be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 3 and 6.
(9 VAC 5-80-1180)

9. **Emission Limits: Nippon Roll Calender (Cal 2)** - Emissions from the operation of the Nippon Roll Calender (Cal 2) shall not exceed the limits specified below:

Particulate Matter	4.53	lbs/hr	15.5	tons/yr
PM-10	4.53	lbs/hr	15.5	tons/yr
VOC	8.38	lbs/hr	28.6	tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits shall be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition 6.
(9 VAC 5-80-1180)

10. **Visible Emission Limit: Calender No. 2** - Visible emissions from Calender Line No. 2 (STK-021) shall not exceed 20% opacity except during one six-minute period in any one hour in which visible emissions shall not exceed 30% opacity as determined by EPA Method 9 (reference 40 CFR Part 60, Appendix A).
(9 VAC 5-80-1180)

11. **Visible Emission Limit: Fabric Filters** - Visible emissions from each fabric filter serving the pre-blenders (Calmix 2b1 and Calmix 2b2) and Banbury mixer (Calmix 2a) shall not exceed 5% opacity as determined by EPA Method 9 (reference 40 CFR Part 60, Appendix A).
(9 VAC 5-80-1180)

RECORDS

12. **On Site Records -** The permittee shall maintain records of emission data and operating parameters as necessary to demonstrate compliance with this permit. The content and format of such records shall be arranged with the Director, Valley Regional Office. Records shall include, but are not limited to:

    a. Annual throughput of raw materials processed by Calender Line No. 2, in tons, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months;

    b. Weekly visible emission stack inspections of Calender No. 2 stack (STK-021) and, if applicable, pre-blenders (Calmix 2b1 and Calmix 2b2) and Banbury mixer (Calmix 2a) including:

        1. The date, time, and name of person performing each inspection;

        2. Whether or not there were visible emissions;

        3. Results of EPA Method 9 (40 CFR 60, Appendix A) testing; and

        4. Any maintenance or repairs performed as a result of these inspections

    c. Emission factors calculated for particulate and VOC emissions to verify compliance with the emissions limitations in Conditions 7, 8 and 9.

    d. Manufacturer's requirements or recommendations for proper installation, maintenance, calibration and operation for each fabric filter as required by Condition 4.

    e. Results of all stack tests and visible emission evaluations.

    These records shall be available for inspection by the DEQ and shall be current for the most recent five years.
    (9 VAC 5-80-1180 and 9 VAC 5-50-50)

CONTINUING COMPLIANCE DETERMINATION

13. **Stack Testing** – Upon request by the DEQ, the permittee shall conduct additional stack testing from the Calender Line No. 2 stack (STK-021) to demonstrate compliance with the emission limits contained in this permit. The details of the tests shall be arranged with the Director, Valley Regional Office.
    (9 VAC 5-80-1180 and 9 VAC 5-50-30 G)

14. **Visible Emissions Evaluation** – The permittee shall perform weekly inspections of the Calender Line No. 2 stack (STK-021) to determine the presence of visible emissions. If during the inspection visible emissions are observed, an EPA Method 9 (40 CFR 60, Appendix A) visible emission evaluation (VEE) shall be conducted by a certified observer. The VEE shall be conducted for a minimum period of six (6) minutes. If any of the observations exceed the standard, the observation period shall continue until sixty (60) minutes of observation have been completed. If the sixty-minute VEE indicates a violation of the standard, timely corrective action shall be taken.
(9 VAC 5-80-1180 and 9 VAC 5-50-30 G)

15. **Visible Emissions Evaluation** – If in the future, the pre-blender(Calmix 2b1 or Calmix 2b2) stacks or Banbury mixer (Calmix 2a) stack are vented to the atmosphere, the permittee shall thereafter perform weekly inspections of each unit (Calmix 2b1, Calmix 2b2 and Calmix 2a) stack vented to the atmosphere to determine the presence of visible emissions. If during the inspection visible emissions are observed, an EPA Method 9 (40 CFR 60, Appendix A) visible emission evaluation (VEE) shall be conducted by a certified observer. The VEE shall be conducted for a minimum period of six (6) minutes. If any of the observations exceed the standard, the observation period shall continue until sixty (60) minutes of observation have been completed. If the sixty-minute VEE indicates a violation of the standard, timely corrective action shall be taken. All observations and corrective action shall be recorded.
(9 VAC 5-80-1180 and 9 VAC 5-50-30 G)

NOTIFICATIONS

16. **Notification for Facility or Control Equipment Malfunction** - The permittee shall furnish notification to the Director, Valley Regional Office, of malfunctions of the affected facility or related air pollution control equipment that may cause excess emissions for more than one hour, by facsimile transmission, telephone or telegraph. Such notification shall be made as soon as practicable but not later than four daytime business hours of discovery of the malfunction. The permittee shall provide a written statement giving all pertinent facts, including the estimated duration of the breakdown, within 14 days of its discovery. When the condition causing the failure or malfunction has been corrected and the equipment is again in operation, the permittee shall notify the Director, Valley Regional Office, in writing.
(9 VAC 5-20-180 C and 9 VAC 5-80-1180)

GENERAL CONDITIONS

17. **Permit Suspension/Revocation** - This permit may be suspended or revoked if the permittee:

    a. Knowingly makes material misstatements in the application for this permit or any amendments to it;

    b. Fails to comply with the conditions of this permit;

    c. Fails to comply with any emission standards applicable to a permitted emissions unit;

d. Causes emissions from this facility which result in violations of, or interferes with the attainment and maintenance of, any ambient air quality standard; or

e. Fails to operate this facility in conformance with any applicable control strategy, including any emission standards or emission limitations, in the State Implementation Plan in effect on the date that the application for this permit is submitted;

(9 VAC 5-80-1210 F)

18. **Right of Entry** - The permittee shall allow authorized local, state and federal representatives, upon the presentation of credentials:

a. To enter upon the permittee's premises on which the facility is located or in which any records are required to be kept under the terms and conditions of this permit;

b. To have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit or the State Air Pollution Control Board Regulations;

c. To inspect at reasonable times any facility, equipment, or process subject to the terms and conditions of this permit or the State Air Pollution Control Board Regulations; and

d. To sample or test at reasonable times.

For purposes of this condition, the time for inspection shall be deemed reasonable during regular business hours or whenever the facility is in operation. Nothing contained herein shall make an inspection time unreasonable during an emergency.
(9 VAC 5-170-130 and 9 VAC 5-80-1180)

19. **Maintenance/Operating Procedures** - At all times, including periods of start-up, shutdown, and malfunction, the permittee shall, to the extent practicable, maintain and operate the affected source, including associated air pollution control equipment, in a manner consistent with good air pollution control practices for minimizing emissions.

The permittee shall take the following measures in order to minimize the duration and frequency of excess emissions, with respect to air pollution control equipment, monitoring devices, and process equipment which affect such emissions:

a. Develop a maintenance schedule and maintain records of all scheduled and non-scheduled maintenance;

b. Maintain an inventory of spare parts;

c. Have available written operating procedures for equipment. These procedures shall be based on the manufacturer's recommendations, at a minimum;

d. Train operators in the proper operation of all such equipment and familiarize the operators with the written operating procedures. The permittee shall maintain records of the training provided including the names of trainees, the date of training and the nature of the training.

Records of maintenance and training shall be maintained on site for a period of five years and shall be made available to DEQ personnel upon request.
(9 VAC 5-50-20 E and 9 VAC 5-80-1180 D)

20. **Record of Malfunctions** - The permittee shall maintain records of the occurrence and duration of any bypass, malfunction, shutdown or failure of the facility or its associated air pollution control equipment that results in excess emissions for more than one hour. Records shall include the date, time, duration, description (emission unit, pollutant affected, cause), corrective action, preventive measures taken and name of person generating the record.
(9 VAC 5-20-180 J and 9 VAC 5-80-1180 D)

21. **Violation of Ambient Air Quality Standard** - The permittee shall, upon request of the DEQ, reduce the level of operation or shut down a facility, as necessary to avoid violating any primary ambient air quality standard and shall not return to normal operation until such time as the ambient air quality standard will not be violated.
(9 VAC 5-20-180 I and 9 VAC 5-80-1180)

22. **Change of Ownership** - In the case of a transfer of ownership of a stationary source, the new owner shall abide by any current permit issued to the previous owner. The new owner shall notify the Director, Valley Regional Office, of the change in ownership within 30 days of the transfer.
(9 VAC 5-80-1240)

23. **Permit Copy** - The permittee shall keep a copy of this permit on the premises of the facility to which it applies.
(9 VAC 5-80-1180)

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Valley Regional Office

INTRA-AGENCY MEMORANDUM

4411 Early Road - P. O. Box 3000 Harrisonburg, VA 22801-3000

Permit Writer	Janardan Pandey		**Date**	DRAFT
Air Permit Manager			**Date**	
Deputy Regional Director			**Date**	
Memo To	Air Permit File			
Facility Name	O'Sullivan Films, Inc.			
Registration Number	80333			
County-Plant I.D.	840-0060			
UTM Coordinates (Zone 17)	743.7	**Easting (km)**	4338.7	**Northing (km)**
Elevation (feet)	720			
Distance to Nearest Class I Area (select one)	~30	**SNP (km)**		**JRF (km)**
FLM Notification Required (Y/N)	N			
AFS Classification (A, SM, B)	A	**Before permit action**	A	**After permit action**
Pollutants for Which the Source is Title V Major	VOC, HAPs	**Before permit action**	VOC, HAPs	**After permit action**
PSD Major Source (Y/N)	Y	**Before permit action**	Y	**After permit action**
Pollutants for Which the Source is PSD Major	VOC	**Before permit action**	VOC	**After permit action**

I. Introduction

O'Sullivan Films, Inc. (O'Sullivan) operates a polyvinyl chloride calendering, coating, laminating, and printing facility at 1944 Valley Avenue in Winchester. The plant produces flexible sheet vinyl plastics that are used for automotive, medical, industrial, and recreational purposes. Products are painted, laminated, or printed according to customer requirements.

The facility's paint lines and laminators are covered in a new source review permit dated April 21, 2005 and amended March 28, 2006.. O'Sullivan also operates three calender lines (Line Nos. 1, 2 and 3) and a rotogravure printing press. Calender Line 1 and the rotogravure printing press were installed before 1972 and have not been evaluated for new source review permitting. The rotogravure press is subject to 40 CFR 63 Subpart KK (National Emissions Standards for Hazardous Air Pollutants from the Printing and Publishing Industry). Calender Line 2 was modified in December 2004 and operates under a minor New Source Review permit dated December 22, 2004 and amended March 28, 2006. Calender Line 3 was exempted from minor new source permitting in December 1988. O'Sullivan has a facility-wide Title V operating permit dated July 1, 2006.

On May 22, 2006, Valley Regional Office (VRO) received a Form 7 application dated May 18, 2006 in which O'Sullivan proposes modifying Calender 2 by increasing allowable raw material throughput and emissions to reflect revised emissions factors resulting from stack testing. Additional information in support of the application was received July 14, 2006, August 24, 2006, October 5, 2006, November 17, 2006, February 1, 2007, May 7, 2007, August 16, 2007 and January 15, 2008.

O'Sullivan also submitted an air permit application to modify its minor NSR permit dated April 21, 2005 as amended March 28, 2006 to revise the regenerative thermal oxidizers (RTOs) minimum combustion zone temperatures as a result of the performance testing conducted for RTOs.

In addition to two minor NSR permits application, DEQ also received a Form 7 application (dated August 1, 2007) requesting a State Operating permit (SOP) to limit potential Bis(2-ethylhexyl)phthalate (DEHP) from the facility. The SOP is being processed concurrently with the two minor NSR permits.

O'Sullivan has also applied for the significant modification of its Title V (TV) permit to incorporate the proposed modified NSR permits and SOP. The proposed modification of the TV permit is being processed concurrently with the minor NSR permits and SOP.

II. Emission Unit / Process Description

O'Sullivan operates Calender 2 (CAL2) for the manufacturing of polyvinyl chloride sheet. Raw materials including polyvinyl chloride resins, plasticizers and additives (e.g., colorants, stabilizers, and lubricants) are mixed in two steps. The first step is the mixing of resins and plasticizers in the pre-blend mixer. The batch is then conveyed to the Banbury mixer. Additives and recycled vinyl from the calendering process are then

mixed in the Banbury mixer. After the materials are thoroughly mixed and heated, the calendering is performed. The calendering operation is the pressing of the vinyl mix between rollers to form vinyl sheet. Emissions of particulate matter (liquid particulate mist of plasticizers, stabilizers and lubricants) is generated from the heating of the vinyl material during the final mixing and calendering. The heat source for this process is steam from either the Cleaver Brooks boiler (rated at 16 MMBtu/hr) or Keeler boiler (rated at 36 MMBtu/hr). Both of these boilers primarily fire natural gas and use No. 2 oil as a backup fuel and are included in the facility's Title V operating permit dated July 1, 2006.

In 2004, O'Sullivan proposed modifying CAL2 by replacing its single pre-blender with two pre-blenders. The modification was subject to minor New Source Review (NSR) permitting under 9 VAC 5 Chapter 80, Article 6. Accordingly, a minor NSR permit was issued December 22, 2004 for CAL2. The permit prescribed the treatment of CAL2 particulate emissions by fabric filter, allowable raw material throughput, emissions limits for particulate matter (PM/PM-10) and volatile organic compounds (VOC), and capture efficiency requirements for a custom-made centrifugal stack used by O'Sullivan to recover plasticizer mist from the calender. Following the 2004 modification, CAL2 is comprised of the following equipment:

- one Nippon Roll calender (CAL2) with a maximum rated capacity of 3.51 tons/hr
- two pre-blenders (CALMIX 2b1 and CALMIX 2b2), each with a capacity of 1.76 tons/hr
- one Banbury mixer (CALMIX 2a) with a capacity of 3.51 tons/hr

CAL2 is a source of VOC, PM/PM-10 and hazardous air pollutants (HAPs).

In 2005, O'Sullivan conducted stack testing to show compliance with the CAL2 VOC and PM-10 emission limits and the control efficiency requirement for its CAL2 centrifugal stack ("stack-in-stack" or SIS) in its 12/22/04 permit. The testing showed that both VOC and PM-10 emissions were higher than the hourly allowable levels and that the SIS unit did not achieve the required capture level. O'Sullivan entered a Consent Order (CO) dated January 10, 2006 that included steps to correct CAL2's noncompliance. The CO included a requirement to retest CAL2 and to use test results to develop emission factors for VOC and PM-10. The CO further required that the emission factors be used to derive corrected emission limits for both pollutants.

O'Sullivan conducted the testing required by the CO in April 2006. The CO required that O'Sullivan submit an application for modification of its 12/22/04 permit within 45 days of test completion. It was in accordance with this requirement that O'Sullivan submitted this CAL2 modification application. The application seeks the following:

- increase in allowable raw material throughput to CAL2 (from 12,000 tons per year (tpy) to 24,000 tpy)
- increase hourly and annual emission limits for VOC and PM-10
- remove designation of SIS unit as a control device

On July 23, 2007, VRO received a revised application that proposes, in addition to the changes included in the May 2006 application, emission limits for a vinyl plasticizer, Bis(2-ethylhexyl) phthalate (DEHP), from the three calendering lines. DEHP is a regulated hazardous air pollutant (HAP).

III. Regulatory Review

A. 9 VAC 5 Chapter 80, Article 6 - Minor New Source Review

The "project" consists of modification of Calender Line No. 2. This Calender Line No. 2 includes one Nippon Roll Calender, two pre-blenders and one Banbury mixer. The heat source for this Calender Line is either the Cleaver Brooks boiler (rated at 16 MMBtu/hr) or Keeler boiler (rated at 36 MMBtu/hr). Both of these boilers are existing boilers and are included in facility's Title V permit. These boilers provide steam to the entire facility. Since neither boiler is "dedicated" to the calender(s), they would be debottlenecked, because the PTE of neither boiler individually would be increased by this change. Accordingly, the proposed "project" includes only Calender Line No. 2 and the boilers are not included.

The net emissions increase of criteria pollutants resulting from the proposed modification for determining minor new source review permitting applicability is shown in Table 1. As shown in Table 1 below, the net emission increases for PM and VOC exceed the modification threshold level in 9 VAC 5-80-1320 D. Therefore, the proposed modification is subject to minor new source review permitting under Article 6. Calculations are provided in Attachment A.

Table 1: **Net Emissions Increases (tons/yr)**

Pollutant	Past Actual	Future Potential	Net Emissions Increase	Annual Exemption Level*	Exemption Level Exceeded?
PM	8.42	23.94	15.52	15	Yes
PM-10	8.42	23.94	15.52	10	Yes
VOC	12.51	36.69	24.18	10	Yes

*Exemption levels for determining permitting applicability (9 VAC 5-80-1320 D).

B. 9 VAC 5 Chapter 80, Article B - PSD Major New Source Review

The facility is a PSD major source for VOC. The proposed modification does not result in an emissions increase exceeding the significance levels in 9 VAC 5-80-1700 *et seq.*, so the proposal is not subject to PSD permitting (See Table 2 below). It should be noted that no other emission units at the facility would experience an emissions increase as a result of the proposed change to Calender Line No. 2. Therefore the proposed modification does not debottleneck emissions or increase potential elsewhere at the plant.

Table 2: "Significance Level" Comparison (tons/yr)

Pollutant	Past Actual	Future Potential*	Net Emissions Increase	Significance Level	Significance Level Exceeded?
PM	8.42	18.67	10.25	25	No
PM-10	8.42	18.67	10.25	15	No
VOC	12.51	28.64	16.13	40	No

*Future Potential is based on the permitted emissions limits.

C. 9 VAC 5 Chapter 50, Part II, Article 5 - NSPS

There are no NSPSs applicable to the proposed modification. 40 CFR 60 Subpart FFF (NSPS for flexible vinyl and urethane coating and printing) does not apply to Calender Line No. 2. Subpart FFF applies to rotogravure printing lines; Calender Line No. 2 is not a rotogravure unit.

D. 9 VAC 5 Chapter 60, Part II, Article 1 - NESHAPS

There are no NESHAPs applicable to the proposed modification.

E. 9 VAC 5 Chapter 60, Part II, Article II - MACT

There are no MACTs applicable to the proposed modification.

IV. Best Available Control Technology Review (BACT) (9 VAC 5-50-260)

The net emissions increases (NEIs) used to determine BACT applicability for the proposed modification are shown in Table 3. The NEIs are calculated as future actual emissions minus past actual emissions, where future actuals are equal to the emissions with proposed throughput limits (not including add-on controls not already required), and past actuals are average emissions of last two years. The permittee has requested a throughput limit of 24,000 tons/yr of raw materials processed through Calender Line No. 2. The maximum capacity of Calender Line No. 2 is 30,748 tons per year. Detailed calculations are shown in Attachment B.

Table 3: **Net Emissions Increases**

Pollutant	Past Actual	Future Potential	Net Emissions Increase	Exemption Level*	Exemption Level Exceeded?
PM	8.42	18.67	10.25	15	No
PM-10	8.42	18.67	10.25	10	Yes
VOC	12.51	28.64	16.13	10	Yes

*Exemption levels for determining BACT applicability (derived from 9 VAC 5-80-1320 D).

As shown in Table 3 above, PM-10 and VOC emissions do exceed their respective BACT exempt emission rate in 9 VAC 5-50-260 C, as defined in 9 VAC 5-80-1320 D for modified sources. As a result, a BACT review is required for PM-10 and VOC. Particulate emissions from pre-blenders and Banbury mixers are already controlled by fabric filters. This meets the BACT requirements for pre-blenders and Banbury mixers for PM-10.

The applicant conducted a Best Available Control Technology (BACT) analysis for VOC and PM emissions from the Calendering operations. The applicant identified available control technology alternatives. Control technologies identified in the BACT/LAER Clearinghouse for similar sources and engineering judgment were used to identify the control options to be reviewed. Following is the brief summary of all the available control technologies. The detailed BACT analysis was submitted with the application.

Oxidation

Oxidation is technologically feasible approach to controlling VOC and PM/PM10 emissions from the Calender operations. Various oxidizers designs are commercially available. However, only thermal oxidation without heat recovery and regenerative thermal oxidation (RTO) are technologically feasible for this application. Other oxidizer designs would not be technologically feasible for this calendering application. Catalytic and recuperative oxidation systems would foul from plastic and oil deposition.

Scrubbing

Scrubbing (absorption) is a technologically feasible approach to controlling PM/PM10 and long chain organic emissions from the Calender operations.

Adsorption

The adsorption technologies are used to collect organic contaminants from air streams. However, because of the presence of polymeric materials in the exhaust, the adsorbent materials would quickly become coated with contaminant materials. Hence, adsorption would not be technologically feasible.

Mechanical Filtration

The organics in the waste stream are largely condensable materials in liquid or gas phase. However, because of the presence of polymeric materials in the exhaust, the filter media would become blinded to the contaminants. Plasticizers and resins are very difficult to remove from wet filter media. Consequently wet mechanical filtration is not technologically feasible for the calendar.

Table 4 shows all the control technologies with control efficiency and whether these technologies are technically feasible or not.

TABLE 4: PM/VOC CONTROL TECHNOLOGIES FOR CAL 2

Control Category	Control Technology	Technologically Feasible	Control Efficiency
Oxidation	Thermal (no heat recovery)	Yes	95%
	Thermal Recuperative	No	-
	Thermal Regenerative	Yes	95%
	Catalytic Oxidation	No	-
Scrubbing	Wet Scrubbing	Yes for PM only	90%
Adsorption	Carbon Adsorption	No	-
	Zeolite Adsorption	No	-
Mechanical Filtration	Mechanical Filtration	No	-

The infeasible technologies were eliminated and the remaining technologies were evaluated based on cost. The cost estimate for this analysis is summarized in Table 5. The detailed cost analysis is provided in Attachment C.

TABLE 5: SUMMARY OF COST BENEFIT ANALYSIS FOR PM/VOC EMISSIONS FROM CALENDER 2

Control Technology	Emission Rate (tons/year)	Reduction (tons/year)	Total Annualized Cost[5] ($/yr)	Average Cost Effectiveness ($/ton)
RTO[1]	44.11	41.90	845,881	20,188
Thermal Oxidation[2]	44.11	41.90	7,183,832	180,998
Venturi Scrubber[3]	15.47	13.92	667,386	47,944
Baseline – No Control[4]	44.11	-	-	-

[1] RTO would control both PM and VOC
[2] Thermal Oxidation would control both PM and VOC[3] Scrubber would control PM only
[4] Baseline emissions include both PM and VOC (15.47 tpy of PM and 28.64 tpy of VOC)
[5] Equipment life of 15 yrs and interest rate of 7% assumed

Based in the cost estimate as listed in the Table 5, the applicant concluded that it is cost prohibitive to install add-on controls. DEQ concurs with this assessment.

V. Summary of Controlled Emissions Increase

Table 6 summarizes the controlled annual criteria pollutants emissions increase from the proposed modification. See Attachment D for detailed calculations. The toxics pollutants emissions are discussed in Section VI. B.

Table 6: Controlled Emissions Increases (tons/yr)

Pollutant	Current Annual Allowable Emissions	Proposed Annual Allowable Emissions	Change in Annual Allowable Emissions	Modeling Threshold Level	Modeling Threshold Level Exceeded?
PM	9.35	18.7	9.35	25	No
PM-10	9.35	18.7	9.35	15	No
VOC	14.34	28.64	14.3	40	No

VI. Dispersion Modeling

A. Criteria Pollutants

The controlled emissions increases of criteria pollutants fall below the modeling thresholds (Table 6 above) contained in the *DEQ New Source Review Permits Program Manual (September 7, 2000)*. Therefore, no modeling is required for these pollutants.

B. Toxic Pollutants

The emissions of all toxic pollutants, except DEHP (bis (2-ethylhexyl) phthalate) as shown in Attachment E, fall below their exemption rates in 9 VAC 5-60-300 C (i.e., the modeling thresholds). However, the emissions of DEHP exceed the modeling threshold. Therefore, no modeling is required for any toxic pollutants except DEHP.

A SOP is being issued concurrently with this minor NSR permit to limit potential DEHP emissions from the entire facility. The applicant has conducted the modeling based on the DEHP emissions limited in the SOP. The modeling results (Attachment F) indicate that DEHP emissions from the facility result in predicted ambient air concentrations below the Significant Ambient Air Concentration (SAAC). Please note that the modeling was performed assuming all three Calenders (Calender Nos. 1, 2 and 3) are operating at same time.

VII. Boilerplate Deviations

The following changes have been made to the existing minor NSR dated December 22, 2004 as amended March 28, 2006. Please note the condition numbers refer to the existing permit. Also, the permit has been updated to reflect current boilerplate language.

Condition 1: Includes the most recent application date for this permit action.

Conditions 10, 11 and 12: The emission limits are revised to reflect the new emission factors (based on the stack testing) and the increased throughput.

Condition 15: This condition is revised to reflect removal of SIS unit as a control device.

Condition 19: This condition (Visible Emission Evaluation for continuous compliance determination) is revised so that the condition matches with the visible emission evaluation for other emission unit.

The following conditions from the existing minor NSR dated December 22, 2004 as amended March 28, 2006 are deleted:

Conditions 3 and 6: These conditions are deleted as designation of SIS unit is removed as a control device.

Conditions 16, 17 and 22: These conditions are deleted as these requirements are already satisfied.

Condition 23: This condition is deleted as Calender Line No. 2 has already been modified. This permit action reflects increase in throughput only and no physical change in emission units are authorized. Hence, the permit invalid condition for this permit action is not included.

VIII. Compliance Demonstration

Compliance with the permit limits will be accomplished through the following requirements:

- Continuing visible emissions evaluations
- Recordkeeping requirements including:
  - Monthly and annual throughput of raw materials processed by Calender Line No. 2, in tons. Annual throughput shall be calculated monthly as the sum of each consecutive 12-month period.
  - Emission factors calculated for particulate and VOC emissions to verify compliance with the emissions limitations in Conditions 7, 8 and 9.
  - Results of all stack tests and visible emission evaluations.
- Notification of control equipment or facility malfunction.

IX. Title V Review - 9 VAC 5 Chapter 80, Article 1

The permit conditions established for Calender Line No. 2 will become applicable requirements and will therefore need to be incorporated into the facility's Title V operating permit. The proposed modification of TV permit is being processed concurrently with the minor NSR permit.

X. Site Suitability

A. The character and degree of injury to, or interference with safety, health, or the reasonable use of property which is caused or threatened to be caused:

The activities regulated in this permit have been evaluated consistent with 9 VAC 5-50-260, 9 VAC 5-60-220, and 9 VAC 5-60-320 and have been determined to meet these standards where applicable.

B. The social and economic value of the activity involved:

This application has been deemed a modification to an existing stationary source, and emissions increases associated with this project are below significance levels defined in 9 VAC 5-80 Article 8 and in 9 VAC 5-80 Article 9. This project is deemed to have de minimis impact on the current emissions levels and does not affect the current social and economic value of the facility.

C. The suitability of the activity to the area in which it is located:

Consistent with the Board's Suitability Policy dated 9/11/87, the activities regulated in this permit are deemed suitable as follows:

1. Air Quality characteristics and performance requirements defined by SAPCB regulations:

This permit is written consistent with existing applicable regulations. The emissions of DEHP exceeded the modeling thresholds. Therefore, modeling was performed for DEHP. The modeling results demonstrated compliance with the applicable SAACs for DEHP. DEHP is limited in the SOP which is concurrently being processed with this minor NSR. The emissions for criteria pollutants associated with this permit are below significance levels so no modeling was performed.

2. The health impact of air quality deterioration which might reasonably be expected to occur during the grace period allowed by the Regulations or the permit conditions to fix malfunctioning air pollution control equipment:

Condition 16 of the permit requires the facility to notify the Regional Office within 4 business hours of the discovery of any malfunction.

3. Anticipated impact of odor on surrounding communities or violation of the SAPCB Odor Rule:

No violation of Odor requirements is anticipated as a result of this permit action.

D. The scientific and economic practicality of reducing or eliminating the discharge resulting from the activity.

The state NSR program as well as the PSD and Non-Attainment programs require consideration of levels of control technology which are written into regulation to define the level of scientific and economic practicality for reducing or eliminating emissions. By properly implementing the Regulations through the issuance of this permit, the staff has addressed the scientific and economic practicality of reducing or eliminating emissions associated with this project.

XI. Other Considerations

This minor NSR permit is being issued concurrently with the other minor NSR permit modification, proposed SOP and Title V modification. The public participation requirements of SOP and Title V modification have been followed. DEQ solicited written public comments on the proposed SOP and Title V permit modification by placing a newspaper advertisement in the Winchester Star on February 15, 2008. A public hearing has been scheduled on May 5, 2008. Public comments will be received until May 20, 2008.

XII. Recommendations

Pending public participation requirements.

Attachments

A: Emission Calculations for Permitting Applicability

B: Emissions calculations for BACT Applicability

C: Cost Analysis for PM/VOC Control technologies

D: Emissions calculations for Controlled Emissions Increase

E: Toxics Pollutant Emissions

F: Modeling Results for DEHP

ATTACHMENT A

Emission Calculations for Permitting Applicability

Table A.1 PM/PM-10 Emission Calculations for Permitting Applicability (tons/yr)

Emission Units	Past Actual	Future Potential	Net Emissions Increase
Preblenders (Calmix002a1 and Calmix002b1)	0.83	1.68	0.85
Banbury Mixer (Calmix 002a)	0.83	2.44	1.61
Calender Line No. 2 (STACK-021)	6.76	19.82	13.06
Total	8.42	23.94	15.52

NOTE:

1. Future potentials are based on operating at 8760 hours and without any control, except for preblender and banbury mixer The preblender and banbury mixer already have federally enforceable requirements of fabric filter control (99%)

Table A.2 VOC Emission Calculations for Permitting Applicability

Emission Units	Past Actual	Future Potential	Net Emissions Increase
Preblenders (Calmix002a and Calmix002b)	0	0	0
Banbury Mixer (Calmix 002a)	0	0	0
Calender Line No. 2 (STACK-021)	12.51	36.69	24.18
Total	12.51	36.69	24.18

NOTE:

1. Future potentials are based on operating at 8760 hours and without any control

TABLE A-3
Calender #2 Projected Emissions
O'Sullivan Films, Inc.

Pollutant	Emission Factor (lb/ton)	Production Throughput (tons/yr)			Average Baseline Emissions (tpy)	Maximum Hourly Production (tph)	Maximum Annual Production (tons/yr)[a]	Maximum Hourly Emissions (lbs/hr) [b]	Maximum Annual Emissions (tpy)[b]
		2006	2005	Average					
PM	1.29	10,668	10,292	10,480.0	6.76	3.51	30,748	4.53	19.82
VOC	2.39	10,668	10,292	10,480.0	12.51	3.51	30,748	8.38	36.69

Notes

(a) The maxim annual production rate of 30,748 ton is based on 8760 hours of operation.

(b) Emission Factors are provided in Tables A-5 and A-6.

TABLE A-4
Calender #2 Mixer Emissions
O'Sullivan Films, Inc.

Year	Source	Product Throughput[a]		Uncontrolled PM Emissions					Controlled PM Emissions	
		tph	tpy	Emission Factor (lb/ton)[b]	Captured Emissions (lb/hr)	Captured Emissions (tpy)[c]	Fugitive Emissions (lb/hr)	Fugitive Emissions (tpy)	lb/hr	tpy[d]
2005	Existing Preblend Mixer	NA	10,292	1.0	NA	4.37	NA	0.77	NA	0.82
	Existing Banbury Mixer	NA	10,292	1.0	NA	4.37	NA	0.77	NA	0.82
2006	Existing Preblend Mixer	NA	10,668	1.0	NA	4.53	NA	0.80	NA	0.85
	Existing Banbury Mixer	NA	10,668	1.0	NA	4.53	NA	0.80	NA	0.85
2005/2006 Average Total	Existing Preblend Mixer									0.83
	Existing Banbury Mixer									0.83
Projected	Preblend mixer #1	1.76	15,374	1.0	1.58	6.92	0.18	0.77	0.19	0.84
	Preblend mixer #2	1.76	15,374	1.0	1.58	6.92	0.18	0.77	0.19	0.84
	Existing Banbury Mixer	3.51	30,748	1.0	2.98	13.07	0.53	2.31	0.56	2.44

Notes

(a) Actual resin throughput for calendar year 2005 and 2006. Projected resin throughput reflects maximum rated capacity of units and 8760 hours/year production

(b) Emission factor is for uncontrolled PM emissions and is based on the following assumptions:

0.1% of mixed material entrained into air during mixing

50% dust supression by plasticizer liquid added at preblend

(c) Capture efficiency of dust collector estimated to be 85% for existing Preblend mixer and existing Banbury mixer, and 90% for new preblend mixers.

(d) Controlled PM emissions are estimated based on 99% filter PM control efficiency. Emissions are sum of fugitive and filter stack emission rates.

TABLE A-5
Calender #2 Test Data
O'Sullivan Films, Inc.

	Compound IQ[a]			
	S-I-S Inlet[b]		S-I-S Outlet[b]	
	Total PM[c] (lb/hr)	VOC[d] (lb/hr)	Total PM[c] (lb/hr)	VOC[d] (lb/hr)
Run 1	1.23	3.45	0.61	2.32
Run 2	3.38	3.67	2.93	2.74
Run 3	NA	3.67	NA	2.7
Average	2.31	3.60	1.77	2.59
Standard Deviation	1.52	0.13	1.64	0.23
	Compound JT[a]			
	S-I-S Inlet[b]		S-I-S Outlet[b]	
	Total PM[c] (lb/hr)	VOC[d] (lb/hr)	Total PM[c] (lb/hr)	VOC[d] (lb/hr)
Run 1	1.95	4.99	1.93	3.66
Run 2	2.35	5.73	2.27	4.28
Run 3	2.16	5.34	2.28	4.45
Average	2.15	5.35	2.16	4.13
Standard Deviation	0.20	0.37	0.20	0.42
	Compound WD[a]			
	S-I-S Inlet[b]		S-I-S Outlet[b]	
	Total PM[c] (lb/hr)	VOC[d] (lb/hr)	Total PM[c] (lb/hr)	VOC[d] (lb/hr)
Run 1	2.40	3.90	1.30	2.69
Run 2	2.73	4.52	1.26	3.60
Run 3	1.36	4.76	2.32	4.16
Run 4	2.00	4.61	2.66	3.97
Average	2.12	4.45	1.89	3.61
Standard Deviation	0.59	0.38	0.71	0.65
Average for All Runs (lb/hr)	**2.17**	**4.46**	**1.95**	**3.46**
Standard Deviation for All Runs (lb/hr)	**0.66**	**0.77**	**0.75**	**0.78**
Average for All Runs plus 1 Standard Deviation for All Runs (lb/hr)	**2.83**	**5.24**	**2.70**	**4.24**
Fugitive Emissions (assuming 85% capture)	**0.50**	**0.92**	**NA**	**NA**

Notes

(a) Three different products were processed during April 2006 test program: compounds IQ, JT and WD.

(b) Testing was conducted at the stack-in-stack (S-I-S) inlet and outlet.

(c) "Total PM" represents the sum of filterable PM and condensable PM emissions obtained by EPA Methods 5 and 202.

(d) "VOC" emissions represent VOC emissions on an "as propane" basis determined by EPA Method 25A.

TABLE A-6
Calender #2 Emission Factors
O'Sullivan Films, inc.

Pollutant	Average Inlet Emission Rate+ 1 Standard Deviation (lb/hr)[a]	Fugitive Emission Rate (lb/hr)[b]	Average Production Rate (ton/hr)	S-I-S Emission Factor (lb/ton)[c]	Fugitive Emission Factor (lb/ton)[c]	Total Emission Factor (S-I-S Emissions + Fugitives) (lb/ton)[c]
PM	2.83	0.50	2.58	1.10	0.194	1.29
VOC	5.24	0.92	2.58	2.03	0.358	2.39

Production Rate (lbs/hr)				
Compound IQ	Compound JT	Compound WD	Average	Average (tons/hr)
6975.4	3456.4	5064.8	5165.5	2.58

Notes

(a) S-I-S inlet emission data from Table 3-1.

(b) Fugitive emissions estimated based on S-I-S inlet emission data and the assumption that the S-I-S achieves 85% capture efficiency. See Table A-5.

(c) Emission factors expressed on a "pound pollutant per ton of product" basis

ATTACHMENT B

Emission Calculations for BACT Applicability

Table B.1 PM/PM-10 Emission Calculations for BACT Applicability

Emission Units	Past Actual	Future Potential	Net Emissions Increase
Preblenders (Calmix002a1 and Calmix002b1)	0.83	1.3	0.47
Banbury Mixer (Calmix 002a)	0.83	1.9	1.07
Calender Line No. 2 (STACK-021)	6.76	15.47	8.71
Total	8.42	18.67	10.25

NOTE:

1. Future potentials are based on throughput limit of 24,000 tons/yr and without any control, except for preblenders and banbury mixe Preblenders and banbury mixer already have federally enforceable requirements of fabric filter control (99%)

Table B.2 VOC Emission Calculations for BACT Applicability

Emission Units	Past Actual	Future Potential	Net Emissions Increase
Preblenders (Calmix002a and Calmix002b)	0	0	0
Banbury Mixer (Calmix 002a)	0	0	0
Calender Line No. 2 (STACK-021)	12.51	28.64	16.13
Total	12.51	28.64	16.13

NOTE:

1. Future potentials are based on operating at througput limit of 24,000 tons/yr and without any control

TABLE B-3
Calender #2 Projected Emissions
O'Sullivan Films, Inc.

Pollutant	Emission Factor (lb/ton)	Production Throughput (tons/yr)			Average Baseline Emissions (tpy)	Maximum Hourly Production (tph)	Maximum Annual Production (tons/yr)[a]	Maximum Hourly Emissions (lbs/hr)[b]	Maximum Annual Emissions (tpy)[b]
		2006	2005	Average					
PM	1.29	10,668	10,292	10,480.0	6.76	3.51	24,000	4.53	15.48
VOC	2.39	10,668	10,292	10,480.0	12.52	3.51	24,000	8.39	28.68

Notes

(a) Requested throughput limit of 24,000 tons per year.

(b) Emission Factors are provided in Tables A-5 and A-6.

TABLE B-4
Calender #2 Mixer Emissions
O'Sullivan Films, Inc.

Year	Source	Product Throughput[a]		Uncontrolled PM Emissions					Controlled PM Emissions	
		tph	tpy	Emission Factor (lb/ton)[b]	Captured Emissions (lb/hr)	Captured Emissions (tpy)[c]	Fugitive Emissions (lb/hr)	Fugitive Emissions (tpy)	lb/hr	tpy[d]
2005	Existing Preblend Mixer	NA	10,292	1.0	NA	4.37	NA	0.77	NA	0.82
	Existing Banbury Mixer	NA	10,292	1.0	NA	4.37	NA	0.77	NA	0.82
2006	Existing Preblend Mixer	NA	10,668	1.0	NA	4.53	NA	0.80	NA	0.85
	Existing Banbury Mixer	NA	10,668	1.0	NA	4.53	NA	0.80	NA	0.85
2004/2005 Average Total	Existing Preblend Mixer									0.83
	Existing Banbury Mixer									0.83
Projected	Preblend mixer #1	1.76	12,000	1.0	1.58	5.40	0.18	0.60	0.19	0.65
	Preblend mixer #2	1.76	12,000	1.0	1.58	5.40	0.18	0.60	0.19	0.65
	Existing Banbury Mixer	3.51	24,000	1.0	2.98	10.20	0.53	1.80	0.56	1.90

Notes

(a) Actual resin throughput for calendar year 2005 and 2006. Projected resin throughput reflects 24,000 tons/yr requested limit

(b) Emission factor is for uncontrolled PM emissions and is based on the following assumptions:

0.1% of mixed material entrained into air during mixing

50% dust supression by plasticizer liquid added at preblend

(c) Capture efficiency of dust collector estimated to be 85% for existing Preblend mixer and existing Banbury mixer, and 90% for new preblend mixers.

(d) Controlled PM emissions are estimated based on 99% filter PM control efficiency. Emissions are sum of fugitive and filter stack emission rates.

ATTACHMENT C

Cost Analysis for PM/VOC Control Technologies

Table C-2
Capital and Operating Costs for RTO
Calender 2 Stack-in-Stack VOC/PM Control

Regenerative Thermal Oxidation with 95% Heat Recovery 7/13/2007

Capital Cost Estimate	Cost ($)	Basis for Estimate
Base unit, Purchase and Install	930,000	Quoted Anguil base cost 1Q04 CS, 25k cfm, OEM (no delivery) = 380,000 Uplift for 40k cfm = (Vol1/Vol2)^0.6*Cost1 = 124,000 Escalation for inflation/steel increases during 2004 = 5% = 25,000 Delivery = 25,000 Rigging/installation/assembly = 50,000 Bake-out upgrade, damper seals, steel, gas = 60,000 Fire damper sensors and alarms = 15,000 Adder for system integration (hardware and software) = 25,000 Spares (motor, drive, stoneware, gas components, seals, dampers)=70,000 Stainless stell upgrade = 20% of base = 100,800 Software/programming for data collection /reporting/archiving=25,000
RTO / stack pad	40,000	Assumes a 60' x 30' pad, 50' stack
Electrical panel pad	5,000	Assumes an 8" elevated pad, splashproof/covered area
Electrical service building with HVAC	80,000	Assumes 40' x 20' 1 story block construction, peak roof grounding loop, HVAC, barometric roof ventilation, facility support alarms, internal and external lighting, garage door entrance, floor pads for electrical components, fire system provisions, 110 VAC services; all mechanical and electrical purchase and install costs included.
Bollards/Paving	20,000	Protection of substation, electrical, gas train, oxidizer
Structural steel/catwalks and ladders	50,000	Assumes ladders & platforms for access to all manways, fan/motor, substation roof, gas train components, ductwork expansion joints, dampers, hydraulics,
Ductwork supports	30,000	Steelwork to support ductwork from existing building penetration to oxidizer or fan inlet, evase supports, expansion joint supports
Piping excavation/supports	10,000	Includes costs for gas train excavation, paving, train supports
Environmental test platform and ladder	15,000	Access ladder, crows nest, test ports, stack clips
Stack modification/replacement	40,000	Assumes removal of existing stack and installation of new 50' high stack, stainless, stee
Ductwork	50,000	Fire dampers, 52" galvanized 10 gauge, 100', evase, expansion joints, flanged, insulated, painted, sealed service door/20',
Gas service feed	30,000	O'Sullivan Communications

Gas train	30,000	Includes all regulators, valves, gauges, pressure/temperature compensating flowmeters, datalogging, component maintenance bypasses, interconnecting piping. All labor, materials and overhead included.
Gas safety requirements	10,000	Insurance underwriter safety requirements including added components, block-n-bleed, fire-eyes
Back-up propane provisions	35,000	Pad, tank, piping for 5 day supply
Power feed from electric service provider	50,000	Telephone pole purchase and installation, high voltage feed
Substation	80,000	Primary transformer from high voltage to 480VAC, lightning arrestors, surge protection, disconnects, switches, wiring, conduit, building penetrations,
Electrical control center	80,000	Includes 1000 amp 480 VAC service panel, starters, heater overloads, disconnects; 200 amp 110 service panel
Variable frequency drive	100,000	Assume 1 primary and 1 spare for 500 hp motor.
Power to fan motor/supports	30,000	Labor, materials, overhead profit for above ground feed and tie-in
Power to controls/supports	20,000	Labor, materials, overhead profit for above ground feed and tie-in
Power to burners/supports	15,000	Labor, materials, overhead profit for above ground feed and tie-in
Services for enclosure exhaust HVAC	5,000	Includes electrical tie-in, HVAC controls, condensor drain, electrical splash guards
Power / Lighting /110VAC recepticals	5,000	Miscellaneous conduit and wiring for indoor and outdoor electrical recepticals, service lighting
Sensors	40,000	Labor and materials for additional sensors and alarms including motor winding thermocouples, duct thermocouples, fan/motor bearing thermocouples, fan/motor bearing vibration sensing, duct static pressure;
Sensor and alarm wiring/commissioning	35,000	Data highway communications wiring/programming for gas consumption, combustion temperature, stack temperature, inlet temperature,
Expense - Relocate Utilities	100,000	O'Sullivan Communications
Subtotal	1,935,000	
Engineering at 15%	290,250	Std Rate for integrated component
Total Capital Cost	**2,225,250**	
Annual Operating Cost Estimate		
Gas	364,166	$12.30/MM BTU
Electricity	140,633	500 hp @$0.06157/kW-Hr
Maintenance	96,750	parts and labor 5% of base cost
Total Annual Operating Cost	**601,549**	

Annualized Cost = (0.1627*2,225,250) + 601,549	963,597	Annualized Cost = (Capital Recovery Factor * Net Present Value) + Annual Operating Cost. Assumes 10 year equipment life, 10% interest rate
VOC/PM Abatement Cost = Annualized cost per ton pollutant abated ($/ton)*	22,995	2006 $

Notes

* Assumes both PM and VOC are organic plasticizers which can be oxidized. Assumes 95% abatement of both VOC and PM: [(28.64 tpy VOC + 15.47 tpy PM)*0.95] = 41.90 tpy VOC/PM abated

Assuming 15 year equipment life and 7% interest rate

CRF = 0.1098

Annualized cost = (0.1098 x 2,225,250) + 601,549

= 845,881

$/ton = 845,881 ÷ 41.90

= $20,188.00

Table C-3
Capital and Operating Costs for Scrubber
Calender 2 Stack-in-Stack PM Control

Venturi Scrubber with Blowdown Treatment 7/13/2007

Capital Cost Estimate	Cost	Basis for Estimate
Base scrubber unit, Purchase and Install	680,000	Quoted base cost Emtrol 1Q02, 304 SS, 40,000 acfm. Escalation 20% for inflation/steel increases from 2002 to 2006. Delivery/rigging/installation/assembly included. Water sensors and alarms included. Electronic hardware for process integration included. Includes spare throat actuator, fan motor and drive.
Scrubber / stack pad / reservoir / waste tank	35,000	Assumes a 45' x 30' pad for scrubber, 50' stack, 1000 gallon reservoir, 2000 gallon waste tank
Electrical panel pad	10,000	Enclosure with HVAC
Service building with HVAC	80,000	Assumes 40' x 20' 1 story block construction, peak roof grounding loop, HVAC, barometric roof ventilation, facility support alarms, internal and external lighting, garage door entrance, floor pads for electrical components, fire system provisions, 110 VAC services; all mechanical and electrical purchase and install costs included.
Bollards/Paving	15,000	Protection of substation, electrical, water treatment piping
Structural steel/catwalks and ladders	80,000	Assumes structural steel for scrubber, ladders & platforms for access to all manways, fan/motor, substation roof, pumps, ductwork expansion joints, dampers, throat, chevrons, reservoirs, tanks.
Ductwork supports	30,000	Steelwork to support ductwork from existing building penetration to scrubber inlet, evase supports, expansion joint supports
Piping/supports/penetrations	20,000	Includes costs for hangers, supports for circulated and make-up water piping and valves
Environmental test platform and ladder	20,000	Access ladder, crows nest, test ports, stack clips
Stack modification/replacement	40,000	Assumes removal of existing stack and installation of new 50' high stack, stainless, steel
Ductwork	50,000	52" galvanized 7 and 10 gauge, 100', evase, expansion joints, flanged, painted, sealed service door/20',
Packaged chemical feed systems	35,000	Assumes 100 gallon reservoir, controls and feed system for a defoaming system, Assumes a 300 gallon reservoir for a powder chemical addition system for precipitation/separation of vinyl from water.
Interconnecting water circulation for scrubber and treatment	60,000	Includes all valves, fittings, piping, expansion joints, connections for scrubber waste and treatment systems

Waste reservoir	20,000	Assumes (2) 5000 gallon mobile tanks with quick fittings
Treatment reservoir	25,000	Assumes a 1000 gallon stainless steel tank with cleanout fitting, lid, sloped bottom, weirs, flush fittings, drain.
Make-up water piping	10,000	Includes process and makeup mater fitting, piping.
Flow meters, switches (liquid)	30,000	Includes flowmeters, flow switches, fittings, level controls, level alarms,
Pressure sensors (air)	20,000	Includes differential pressure sensors for scrubber components, associated alarms
Circulation pumps, demister cleaning pump, transfer pumps	60,000	Assumes 500 gpm design circulation rate for scrubber, transfer pumps between reservoir, treatment and waste tanks, deminster cleaning pumps / valves/nozzles
Power feed from electric service provider	50,000	Telephone pole purchase and installation, high voltage feed
Substation	100,000	Primary transformer from high voltage to 480VAC, lightning arrestors, surge protection, disconnects, switches, wiring, conduit, building penetrations,
Electrical control center	80,000	Includes 1000 amp 480 VAC service panel, starters, heater overloads, disconnects; 200 amp 110 service panel
Variable frequency drive	80,000	Assume 1 primary and 1 spare for 800 hp motor.
Power to fan motor/supports	30,000	Labor, materials, overhead profit for above ground feed and tie-in
Power to controls/supports	20,000	Labor, materials, overhead profit for above ground feed and tie-in
Power to treatment plant	15,000	Labor, materials, overhead profit for above ground feed and tie-in
Power feed to enclosure exhaust HVAC	5,000	Includes electrical tie-in, HVAC controls, condensor drain, electrical splash guards
Power / Lighting /110VAC recepticals	5,000	Miscellaneous conduit and wiring for indoor and outdoor electrical recepticals, service lighting
Sensors	50,000	Labor and materials for additional sensors and alarms including motor winding thermocouples, cone/body level indicators, duct proof of flow switching, fan/motor bearing thermocouples, fan/motor bearing vibration sensing, proximity switches
Sensor and alarm wiring	25,000	Data highway communications wiring/programming for flowrates, chemical feed rates, tank levels, scrubber cone level, alarms.
Expense - Relocate Utilities	100,000	O'Sullivan Communications
Subtotal	1,880,000	
Engineering at 15%	282,000	Std Rate for integrated component
Total Capital Cost	**2,162,000**	
Annual Operating Cost Estimate		
Chemical treatment	24,000	
Electricity (700 hp @$0.06157/kW-Hr)	281,557	

Maintenance (parts and labor 5% of base cost)	94,000	
Disposal	30,441	
Total Annual Operating Cost	**429,998**	

Annualized Cost = (0.1627*2,162,000) + 429,998	**781,755**	*Annualized Cost = (Capital Recovery Factor * Net Present Value) + Annual Operating Cost. Assumes 10 year equipment life and 10% interest rate
PM Abatement Cost = Annualized cost per ton of pollutant abated ($/ton)*	**56,148**	2006 $

Notes

* Assumes PM organic plasticizers can be scrubbed. Assumes 90% abatement for PM: (15.47 tpy PM*0.90) = 13.92 tpy PM abated

Assuming 15 yr equipment life and 7% interest rate

CRF = 0.1098

Annualized Cost = (0.1098 × 2,162,000) + 429,998

= 667,386

$/ton = 667,386 ÷ ~~15.47~~ 13.92

= ~~$43,144.00~~

= $47,944.00

Table C-4 (January 2008)
Capital and Operating Costs for Thermal Oxidizer with No Heat Recovery
Calender 2 Stack-in-Stack VOC/PM Control

1/11/2008

Capital Cost Estimate	Cost ($)	Basis for Estimate
Base unit, Purchase and Install	491,000	Assumes 50% cost of RTO
RTO / stack pad	35,000	Assumes a 60' x 30' pad, 50' stack
Electrical panel pad	4,500	Assumes an 8" elevated pad, splashproof/covered area
Electrical service building with HVAC	80,000	Assumes 40' x 20' 1 story block construction, peak roof grounding loop, HVAC, barometric roof ventilation, facility support alarms, internal and external lighting, garage door entrance, floor pads for electrical components, fire system provisions, 110 VAC services; all mechanical and electrical purchase and install costs included.
Bollards/Paving	12,000	Protection of substation, electrical, gas train, oxidizer
Structural steel/catwalks and ladders	25,000	Assumes ladders & platforms for access to all manways, fan/motor, substation roof, gas train components, ductwork expansion joints, dampers, hydraulics,
Ductwork supports	30,000	Steelwork to support ductwork from existing building penetration to oxidizer or fan inlet, evase supports, expansion joint supports
Piping excavation/supports	10,000	Includes costs for gas train excavation, paving, train supports
Environmental test platform and ladder	15,000	Access ladder, crows nest, test ports, stack clips
Stack modification/replacement	40,000	Assumes removal of existing stack and installation of new 50' high stack, stainless, stee
Ductwork	50,000	Fire dampers, 52" galvanized 10 gauge, 100', evase, expansion joints, flanged, insulated, painted, sealed service door/20',
Gas service feed	30,000	O'Sullivan Communications
Gas train	30,000	Includes all regulators, valves, gauges, pressure/temperature compensating flowmeters, datalogging, component maintenance bypasses, interconnecting piping. All labor, materials and overhead included.
Gas safety requirements	10,000	Insurance underwriter safety requirements including added components, block-n-bleed, fire-eyes
Back-up propane provisions	35,000	Pad, tank, piping for 5 day supply
Power feed from electric service provider	50,000	Telephone pole purchase and installation, high voltage feed
Substation	60,000	Primary transformer from high voltage to 480VAC, lightning arrestors, surge protection, disconnects, switches, wiring, conduit, building penetrations,
Electrical control center	60,000	Includes 1000 amp 480 VAC service panel, starters, heater overloads, disconnects; 200 amp 110 service panel

Variable frequency drive	60,000	Assume 1 primary and 1 spare for 300 hp motor.
Power to fan motor/supports	25,000	Labor, materials, overhead profit for above ground feed and tie-in
Power to controls/supports	20,000	Labor, materials, overhead profit for above ground feed and tie-in
Power to burners/supports	15,000	Labor, materials, overhead profit for above ground feed and tie-in
Services for enclosure exhaust HVAC	5,000	Includes electrical tie-in, HVAC controls, condensor drain, electrical splash guards
Power / Lighting /110VAC recepticals	5,000	Miscellaneous conduit and wiring for indoor and outdoor electrical recepticals, service lighting
Sensors	40,000	Labor and materials for additional sensors and alarms including motor winding thermocouples, duct thermocouples, fan/motor bearing thermocouples, fan/motor bearing vibration sensing, duct static pressure;
Sensor and alarm wiring/commissioning	35,000	Data highway communications wiring/programming for gas consumption, combustion temperature, stack temperature, inlet temperature,
Expense - Relocate Utilities	100,000	O'Sullivan Communications
Subtotal	1,372,500	
Engineering at 15%	205,875	Std Rate for integrated component
Total Capital Cost	**1,578,375**	
Annual Operating Cost Estimate		
Gas	7,295,000	$12.30/MM BTU
Electricity	46,902	300 hp @$0.06157/kW-Hr
Maintenance	68,625	parts and labor 5% of base cost
Total Annual Operating Cost	**7,410,527**	

Annualized Cost = (0.1627*1,578,375) + 7,410,527	**7,667,329**	Annualized Cost = (Capital Recovery Factor * Net Present Value) + Annual Operating Cost. Assumes 10 year equipment life, 10% interest rate
VOC/PM Abatement Cost = Annualized cost per ton pollutant abated ($/ton)*	**182,971**	2006 $

Notes

41.9 VOC/PM abated

Assuming 15 yr equipment life and 7% interest rate

CRF = 0.1098

Annualized cost = (0.1098 x 1,578,375) + 7,410,527

= $7,583,832

$/ton = 7,583,832 ÷ 41.9 = $ 180,998

ATTACHMENT D

Emissions Calculations for Controlled Emissions Increase

Table D.1 PM/PM-10 Controlled Emissions Increase (tons/yr)

Emission Units	Current Emissions	Proposed Emissions	Change in Emissions
Preblenders (Calmix002a1 and Calmix002b1)	0.65	1.3	0.65
Banbury Mixer (Calmix 002a)	0.95	1.9	0.95
Calender Line No. 2 (STACK-021)	7.75	15.5	7.75
Total	9.35	18.7	9.35

NOTE:

1. The current emissions are based on 12,000 tons/yr throughput limit and new emission factors

Table D.2 VOC Controlled Emissions Increase

Emission Units	Current Emissionsl	Proposed Emissions	Emissions Increase
Preblenders (Calmix002a and Calmix002b)	0	0	0
Banbury Mixer (Calmix 002a)	0	0	0
Calender Line No. 2 (STACK-021)	14.34	28.64	14.3
Total	14.34	28.64	14.3

NOTE:

1. The current emissions are based on 12,000 tons/yr throughput limit and new emission factors

ATTACHMENT E

Toxics Pollutant Emissions

Table E-1
Toxics Emissions and Exemption Levels
Calender No. 2

HAPs	CAS	Emissions (lb/hr)	Exemption Level (lb/hr)	Emissions (ton/yr)	Exemption Level (ton/yr)
Benzene	71432	0.0012	2.112	0.0041	4.64
Bis(2-ethylexyl) phthalate	117817	**4.52**	0.33	**12.8700**	0.725
Chloromethane	74873	0.0013	6.831	0.0045	14.935
Ethyl benzene	100414	0.0018	-	0.0060	-
Dichloromethane	75092	0.01004	11.484	0.0343	25.23
Napthalene	91203	0.0138	2.607	0.0473	7.54
Toluene	108883	0.0033	18.645	0.0140	54.665
Trichloroethylene	79016	0.004	22.8	0.0138	39.005
o-xylene	95476	0.0054	21.483	0.0183	62.93
m-xylene	108383	0.0042	21.483	0.0142	62.93
p-xylene	106423	0.0042	21.483	0.0142	62.93

Note: See Table E-2 for emission factors

Table E-2
Calender 2 Air Toxic Emissions

Calendar 2 Air Toxics Emission Factors		
Lebanon Test Data[a]		
Pollutant[b]	Emissions (lb/hr)	Emissions Factor (lbs pollutant/ton product)
Benzene	0.00051	0.00034
Methyl chloride/Chloromethane	0.00057	0.00038
Ethyl benzene	0.00075	0.00050
Methylene chloride/Dichloromethane	0.00429	0.00286
Toluene	0.00140	0.00093
Trichloroethylene	0.00172	0.00115
o-xylene	0.00229	0.00153
m-xylene	0.00178	0.00118
p-xylene	0.00178	0.00118
Naphthalene	0.00592	0.00394

[a] Emission data from testing conducted at O'Sullivan's Lebanon PA plant calender in 1997. Average production rate was 2,999 lb/hr during test.

Calender 2 Air Toxics Maximum Emission Rates					
	Maximum Prod. Rates		Emission Factor	Emissions	
Pollutant [a]	Hourly (tons/hr)	Annual (tpy)	(lbs/ton)	(lbs/hr)	(ton/yr)
Benzene	3.51	24,000	0.00034	0.00120	0.00410
Methyl chloride/Chloromethane	3.51	24,000	0.00038	0.00132	0.00453
Ethyl benzene	3.51	24,000	0.00050	0.00175	0.00599
Methylene chloride/Dichloromethane	3.51	24,000	0.00286	0.01004	0.03432
Toluene	3.51	24,000	0.00093	0.00328	0.01120
Trichloroethylene	3.51	24,000	0.00115	0.00402	0.01376
o-xylene	3.51	24,000	0.00153	0.00536	0.01832
m-xylene	3.51	24,000	0.00118	0.00415	0.01420
p-xylene	3.51	24,000	0.00118	0.00415	0.01420
Naphthalene	3.51	24,000	0.00394	0.01384	0.04732
DEHP [b]	3.51	24,000	-	4.52000	12.87000

[a] Emission data from testing conducted at O'Sullivan's Lebanon PA plant calender in 1997. Average production rate was 2,999 lb/hr during test.

[b] Emissions of DEHP based on mass balnce using emission factor of 1.29 lb DEHP/ton resin. (3.5 tph resin) x (1.29 lb DEHP/ton resin) = 4.52 lb DEHP/hr

Annual DEHP emission is based on 65% of the maximum hourly emission rate.
(4.52 lb/hr) (8760/2000) (0.65) = 12.87 tpy

ATTACHMENT F:

Modeling Results for DEHP

TABLE F-1
Modeling Results that Demonstrate Attainment with Significant Ambient Air Concentration (SAAC)*

Toxic Pollutant	Modeling Results		SAAC		Model
	Maximum 1-hour Impact ($\mu g/m^3$)	Maximum Annual Impact ($\mu g/m^3$)	1-hour Concentration ($\mu g/m^3$)	Annual Concentration ($\mu g/m^3$)	
Bis(2-ethylhexyl) phthalate (DEHP)	225.28	9.22	250	10	ISCPRIME

* Modeling was conducted assuming all three calendars are operating at same time with emission rates as listed in TABLE F-2.

TABLE F-2
Summary of DEHP Emissions for Calender Lines

Line	PM Emission Factor[1] (lb/ton)	Maximum Short-Term Hourly Production (tph)	Maximum Hourly DEHP Emission (lbs/hr)	Maximum Long-Term Average DEHP Emission[2] (lbs/hr)	Maximum Annual DEHP Emission[3] (tpy)
Calender #1	1.29	3.51	4.52	2.94	12.88
Calender #2	1.29	3.51	4.52	2.94	12.88
Calender #3	1.29	3.51	4.52	2.94	12.88

Notes

1. DEHP plasticizer emissions conservatively assumed to equal PM emissions measured during April 2006 test.

2. Based on 65% of plasticizer as DEHP on a 12-month average basis.

3. Maximum annual DEHP emissions using long-term average rate assuming 8,760 hrs/yr production.